Introduction to Variables and Equations

Introduction to Variables and Equations: Apply, Compare, and Design

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

A variable stands for an unknown number. In $x + 7 = 19$, undo $+7$ with $19 - 7 = 12$, then check $12 + 7 = 19$. For $4x = 28$, divide: $x = 28 \div 4 = 7$. An equation states that both sides have the same value.

Worked example

Solve $x + 6 = 15$. Show an inverse step and substitution.

1. Undo the operation: $x = 15 - 6$.
2. Calculate: $15 - 6 = 9$.
3. Substitute: $9 + 6 = 15$, so $x = 9$.
Answer: $x = 9$.

Practice Problems

Show your thinking.

1. Each of four tables has x crayons and gets 3 more. The new total is 44. Which equation fits, $4(x + 3) = 44$ or $4x + 3 = 44$? Find x.

2. A game shop charges 6 dollars per game and one 5-dollar fee. A group has 35 dollars. Write an equation for spending it all and decide whether buying one more game would fit the budget.

3. Design an equation with one addition that has $x = 7$ as its only solution. Use 18 on the right and explain the missing addend.

4. A balance shows $x + 4 = 16$. Mia removes 4 from the left only and writes $x = 16$. Explain why that changes the balance and give the correct value.

5. Machine A adds 7 to an input n. Machine B doubles n. For which of the inputs 6, 7, and 8 do they show equal outputs? Use the equation $n + 7 = 2n$ to test.

6. Four equal jars have m marbles each. Adding 8 loose marbles makes 40 altogether. Now imagine there were 4 fewer loose marbles and the same total. Write the new equation and find how much larger each jar count would be.

7. Each child gets one sticker from each of 3 rolls, then the teacher keeps 4 extra stickers. There are 25 stickers total. Let c be the number of children. Should 4 be added once or three times? Write and solve the correct equation.

8. The same unknown ribbon length r is used in both tests. Adding 9 cm gives 21 cm. Removing 3 cm is supposed to leave 10 cm. Can both claims be true? Find the corrected second measurement.

Answer Key

1. $4(x+3)=44$; 8 crayons per table to start.
2. $6g+5=35$; 5 games. One more would not fit.
3. $x+11=18$.
4. Remove 4 from both sides; $x=12$.
5. Only $n=7$, when both show 14.
6. $4m+4=40$; 9 per jar instead of 8, so 1 more each.
7. Add 4 once: $3c+4=25$; 7 children.
8. No. $r=12$ cm, so removing 3 cm leaves 9 cm.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Each table has $x+3$ after the change. All four give $4(x+3)=44$.
2. One table has $44\div 4=11$ crayons after the change.
3. It started with $11-3=8$; check $4(8+3)=44$.

Problem 2

1. Let g count games. The total charge is $6g+5$, so set it equal to 35.
2. After the fee there are $35-5=30$ dollars, enough for $30\div 6=5$ games.
3. Six games would cost $6(6)+5=41$ dollars, exceeding the budget.

Problem 3

1. The added amount must take 7 up to 18, so it is $18-7=11$.
2. This gives $x+11=18$. Subtracting 11 gives the single value $x=7$; $7+11=18$ checks it.

Problem 4

1. The left and right start equal. Removing 4 on only one side makes that side 4 smaller.
2. Remove 4 on both sides: $x=16-4=12$. Check $12+4=16$.

Problem 5

1. At $n=6$, outputs are $6+7=13$ and $2(6)=12$.
2. At $n=7$, outputs are $7+7=14$ and $2(7)=14$.
3. At $n=8$, outputs are $8+7=15$ and $2(8)=16$. Only 7 matches.

Problem 6

1. Original jars share $40-8=32$, or $32\div 4=8$ each.
2. The new loose count is $8-4=4$. Write $4m+4=40$.
3. Now $40-4=36$ go into jars, and $36\div 4=9$ each. That is $9-8=1$ more.

Problem 7

1. The rolls supply $3c$ stickers for children, and the 4 extras are kept once.
2. $3c=25-4=21$. Divide by 3: $c=7$.
3. Check that $3(7)+4=25$ stickers.

Problem 8

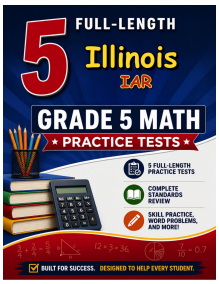
1. From $r+9=21$, subtract 9: $r=21-9=12$ cm.
2. Test the second claim: $12-3=9$ cm, not 10 cm.

TESTINAR

Keep Building Grade 5 Math Skills

Choose the practice book matched to your state assessment and turn worksheet practice into a complete test-prep plan.

All Grade 5 books



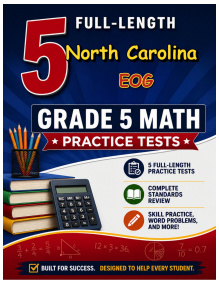
ILLINOIS IAR

5 Full-Length Math Practice Tests

Build Grade 5 accuracy, confidence, and test stamina with 5 printable practice tests.

Printable eBook • Instant PDF access

View eBook



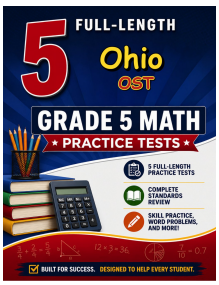
NORTH CAROLINA EOG

5 Full-Length Math Practice Tests

Build Grade 5 accuracy, confidence, and test stamina with 5 printable practice tests.

Printable eBook • Instant PDF access

View eBook



OHIO OST

5 Full-Length Math Practice Tests

Build Grade 5 accuracy, confidence, and test stamina with 5 printable practice tests.

Printable eBook • Instant PDF access

View eBook

Need a different state?
Testinar has Grade 5 math practice books for state assessments across the country.

TESTINAR.COM/GRADES/5